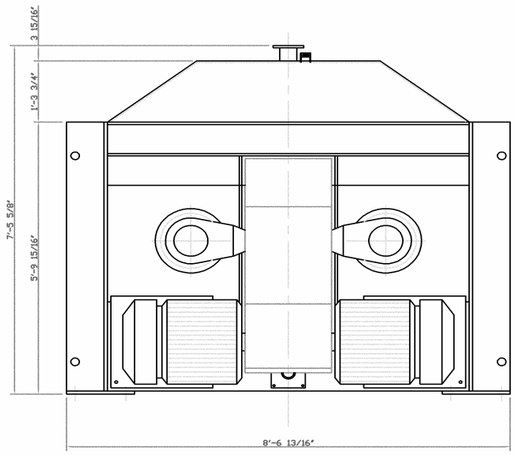
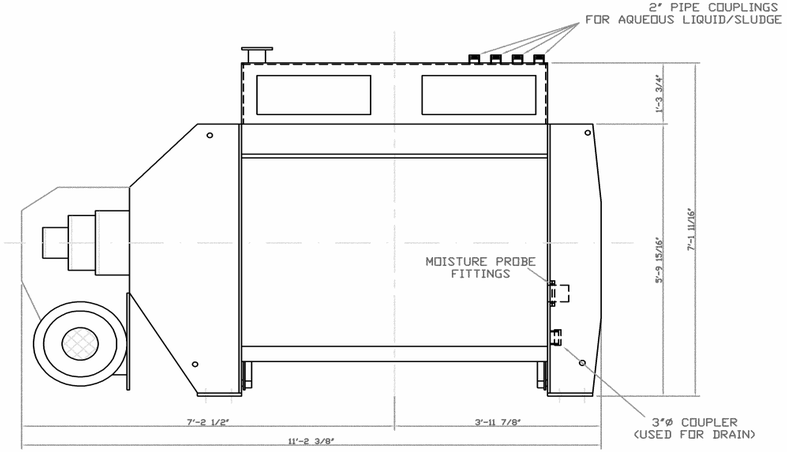
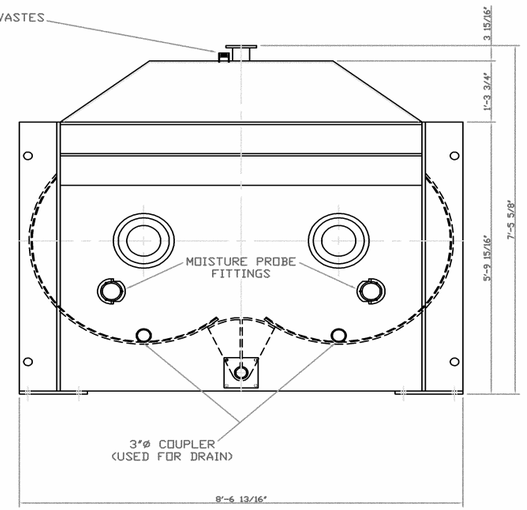
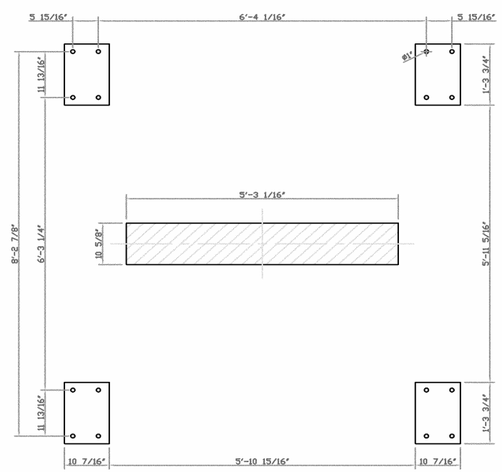
Attachment 2, Section 2

Besser-Simen Mixer

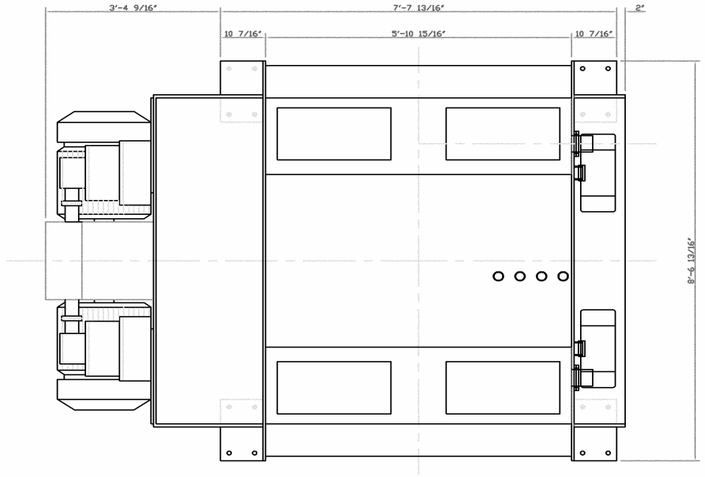








BASE PLATES



TOP VIEW

BY	NO.	DATE	REVISION
	6		
	5		
	4		
	3		
	2		
WJS	1	2-24-03	ADDED MOISTURE PROBE FITTINGS & 2" COUPLINGS

MATERIAL SPECIFICATION
UNLESS OTHERWISE NOTED
STRUCTURAL STEEL - ASTM A36
MINERAL & POST - ASTM A53
GRADE B, SCHEDULE 40
ALL PIPE AIR THREADS - ASTM A39
CAST IRON - ASTM A48
SHAFTS - HEAT TREAT

TOLERANCES:
UNLESS OTHERWISE NOTED
FRACTIONAL +/- 1/32"
ANGULAR +/- 0°30'

DRAWN BY: WJS
CHECKED BY: RWO
DATE: 02-20-03
SCALE: 3/4"=1'-0"
REF.:

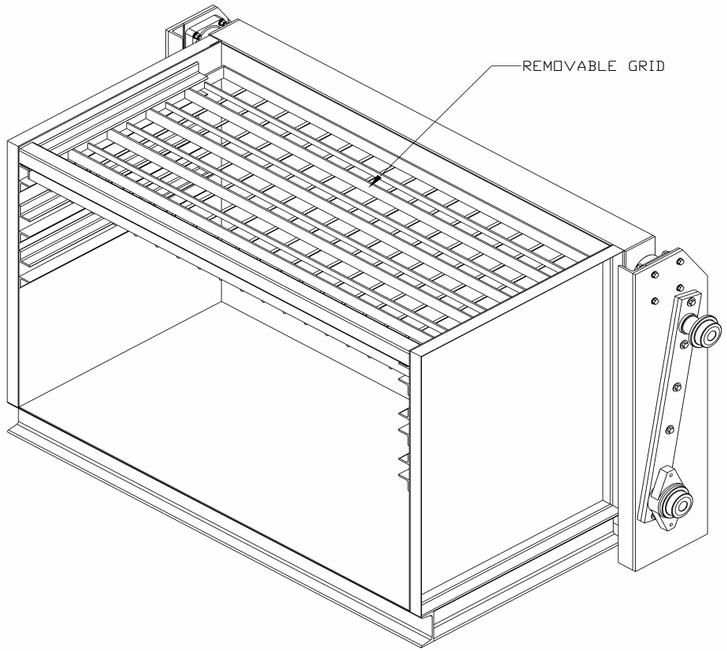
SALES & ENGINEERING
P.O. BOX 1196
SAN ANTONIO, TEXAS 78295-1196
PHONE: 210-599-1111
FAX: 210-599-1668

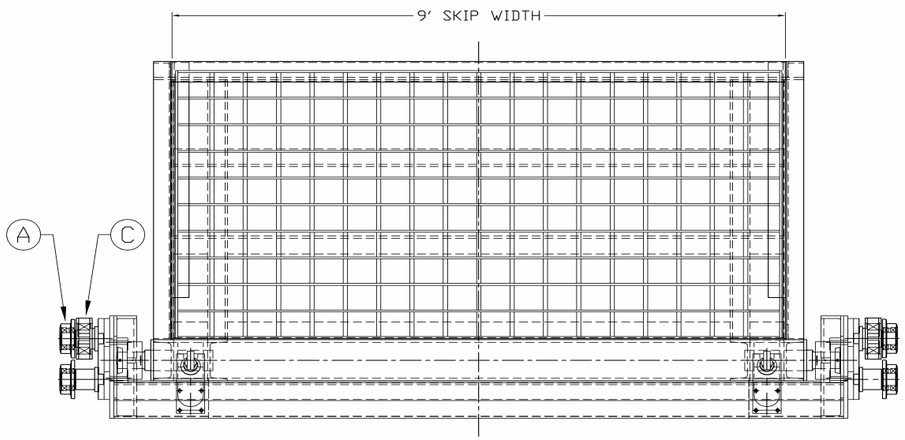
BESSER SAN ANTONIO

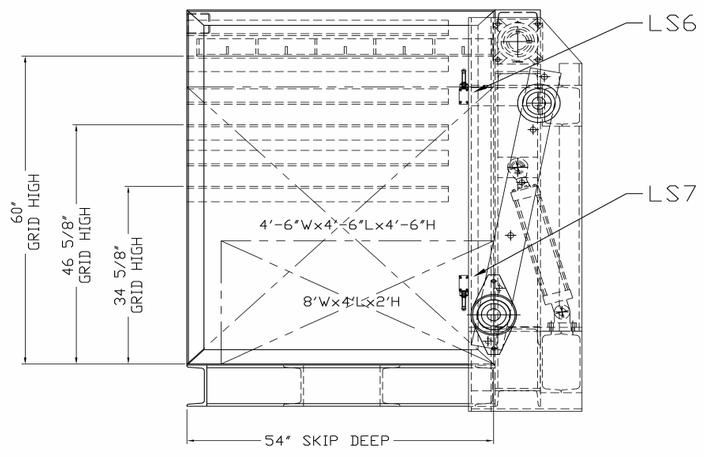
MANUFACTURING
648 N. W.W.WHITE ROAD
SAN ANTONIO, TEXAS 78219

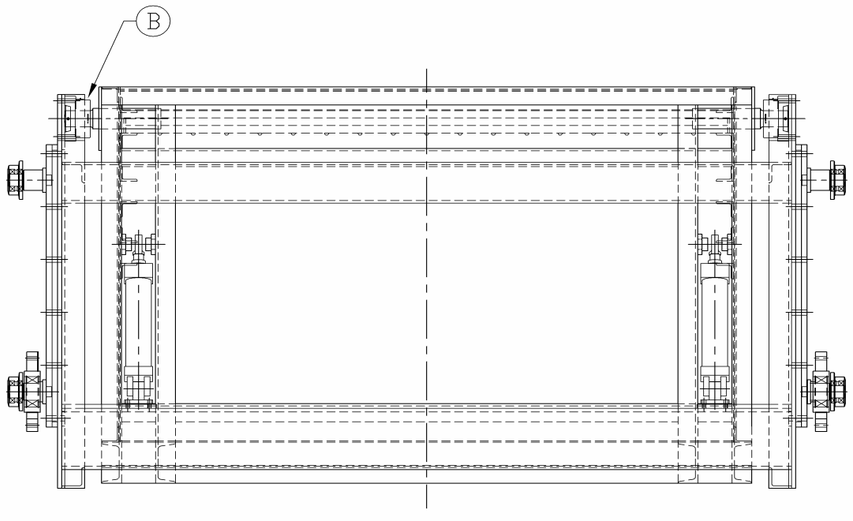
BESSER SIMEM TWIN SHAFT MIXER
GEMINI 3 WITH (2) DRAINS
BESSER AMERICAN FABRICATION INC.

FILE NO. 34583
PROPOSAL NO. FHEA0005
SHT 01 OF 01
REV. #1









BILL OF MATERIALS

ITEM	QTY	MFG	DESCRIPTION/CATALOG NO.
A	4	ESSEX	GUIDE WHEEL - 8HIDX60mmRB
B	2	LINK BELT	BEARING - EFR-B22451H
C	2	ESSEX	CHAIN ATTACHMENT

GENERAL NOTES

REFERENCE DRAWINGS

DRAWING NO.	DESCRIPTION

SAFETY NOTICE

THIS EQUIPMENT WAS/WAS NOT PURCHASED WITH A PERSONNEL SAFETY ENCLOSURE. IT IS THE PURCHASER/USERS RESPONSIBILITY TO MANTAIN THE SAFETY ENCLOSURE IN ITS ORIGINAL WORKING CONDITION OR TO PROVIDE A SAFETY ENCLOSURE OR OTHER SUITABLE SAFETY DEVICE(S) CONFORMING TO OSHA REQUIREMENTS BEFORE OPERATING THIS EQUIPMENT.

DISCLAIMER

REV	DATE	BY	CHKD	DESCRIPTION
1	01-10-03	CHV		COMPLETED DRAWING FOR APPROVAL

ESSEX • RISE CORPORATION

CUSTOMER P.O. NO.

DRAWING NUMBER 6014-2

SCALE	DATE	CHECKED	DRAWN BY
1/2"=1'-0"	01-02-03		CHV

TITLE: SKIP DETAIL

CUSTOMER: AMERICAN FABRICATION

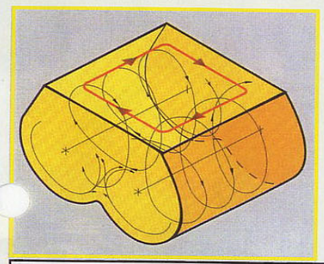
Twin Shaft Type - Gemini Mixer

S PRESTRESSED PIPE BLOCK PAVING PRECAST CEMENT LANDSCAPE AGGREGATES PIPE BLOCK PAVING PRECAST CEMENT LANDSCAPE AGGREGATES PRESTRESSED PIPE

The industry standard in the dry cast, wet cast and high performance concrete markets

Plants producing ready-mix, concrete products, precast, prestress, pipe and roller compacted concrete rely on Besser Simem Twin Shaft mixers when consistency, speed and efficiency are demanded.

The Twin Shaft mixer is able to handle 0" to high slump mix designs with optional configurations up to 6" (150 mm) aggregate. The synchronized shafts of the Twin Shaft mixer force a low shear in the mix which allows every particle of sand and aggregate to be coated with cement. This gives the most homogeneous mix possible in as fast as 20 seconds for wet batches and 60 seconds for pipe and concrete products.

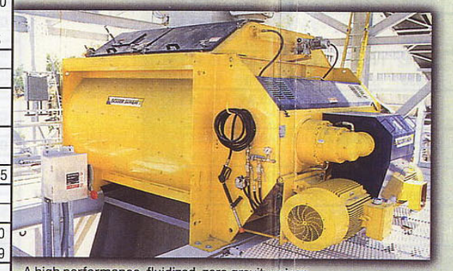


This is accomplished by compulsory collision of the materials. Low shear, yet high intensity mixing results in extremely short mix times, with superior results.

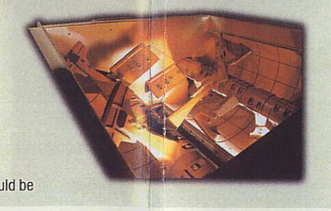
Plant owners benefit from the ability to provide a high quality product in a short period of time and save on cement costs. This adds up to increased production and profits.

Standard Features

- Driven by electric motors, the twin stage planetary gear boxes, rated at 94% efficiency, are connected to the main shafts with articulated joints. This eliminates the transmission of any possible force from the mixing shafts to the reducer output shafts. The gear boxes are virtually isolated from all deflection.
- All four shaft seals are continuously greased by an automatic lubrication system. The self-lubricating system provides a positive flow of grease to the backside of the seals preventing grout from passing into the seals.
- The grease pump on the automatic lubricating system is mechanically driven by the mixing shafts.
- Bearings for the mixing shafts are installed on separate flanges and isolated from the concrete seals, protecting the bearings.
- The discharge gate is operated by a single hydraulic cylinder connected to a hydraulic power unit, with an oil tank of 5 gallons (20 l) capacity. The unit comes complete with a hand pump for emergency discharging.
- The unique design of the mixing arms allow for installation in different configurations depending on aggregate size. This feature ensures optimum performance by allowing mixer arms to be installed at 45 degrees for fine grains, 90 degrees for standard concrete or 180 degrees when large sized aggregates are used.



A high performance, fluidized, zero gravity mixer



Gemini Series Twin Shaft Specifications

MODEL		1	1.5	1.75	2	2.6	3	4	5	6	8	10	12
INTERNATIONAL MODEL NUMBER		1250	1500	2000	2500	3000	3700	4500	6000	6000HD	9000	12000	14000
FRESH CONCRETE ACTUAL IN/OUTPUT	cu yd	1.25	1.50	1.75	2.20	2.60	3.25	3.90	5.20	6.00	8.00	10.00	12.00
	lb	4224	5280	6864	8976	10,560	13,200	15,840	21,120	21,120	31,680	40,500	48,500
	cu m	.956	1.15	1.34	1.68	1.99	2.48	2.98	3.98	5.96	6.12	7.65	9.17
	l	956	1147	1338	1682	1988	2485	2982	3976	4587	6116	7646	9175
MIXING TIME - Seconds	wet cast	30	30	30	30	35	35	35	35	35	40	40	40
	dry cast	60	60	60	60	60	60	60	60	60	60	60	60
DISCHARGE TIME - Seconds	wet cast	10*	10*	10*	10*	10*	10*	10*	10*	10*	10*	8*	8*
	dry cast	12*	12*	12*	12*	12*	12*	12*	12*	12*	10*	10*	10*
MAXIMUM AGGREGATE SIZE*	in	5	5	5	5	5	6	6	6	6	6	6	6
	mm	120	120	120	120	120	150	150	150	150	150	150	150
MIXING MOTORS	hp	1 x 30	1 x 50**	2 x 30	2 x 40	2 x 50	2 x 60	2 x 75	2 x 100	2 x 125	2 x 150	4 x 100	4 x 125
HYDRAULIC DISCHARGE MOTOR	hp	2	2	2	2	2	3	3	3	3	4	4	4
	kW	1.5	1.5	1.5	1.5	1.5	2.2	2.2	2.2	2.2	3	3	3
MIXER WEIGHT	lb	11,900	12,100	13,000	13,200	15,200	20,000	22,250	25,600	25,600	38,500	44,000	48,500
	kg	5400	5500	5900	6000	6900	9100	10,090	11,650	11,650	17,500	19,958	21,999
DIMENSIONS													
"A" WIDTH	in	102	102	122	122	128	133	150	156	156	178	234	246
	mm	2600	2600	3100	3100	3250	3400	3800	3980	3980	4530	5943	6248
"B" WIDTH	in	80	80	80	80	92	102	102	116	116	135	136	136
	mm	2052	2052	2052	2052	2348	2610	2610	2950	2950	3450	3454	3454
"C" HEIGHT	in	53	53	53	53	61	69	69	75	75	89	118	118
	mm	1350	1350	1350	1350	1550	1755	1755	1920	1920	2280	2997	2997
MIXER WEIGHT	lb	11,900	12,100	13,000	13,200	15,200	20,000	22,250	25,600	25,600	38,500	44,000	48,500
	kg	5400	5500	5900	6000	6900	9100	10,090	11,650	11,650	17,500	19,958	21,999

* dependent on total mix design ** 1.5 with either 2 x 30 or 1 x 50 mixing motors

NOTE: The Besser Gemini Series Twin Shaft mixer does not require de-rating for low slump or dry materials, based on hp or lb capacity. The Gemini should be de-rated however, for volume if mixing dry, loose or lighter weight materials. Specified volume is calculated based on 150 lbs per cubic foot.

Optional Enhancements

All Mixers

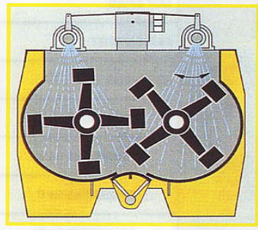
Mixer Washdown

A high-pressure washdown system reduces operating costs and time. Any mixer can be equipped with this cleaning device. An operator uses a high-pressure wand to clean the mixer. The mixer washdown equipment is comprised of a high volume, medium pressure triplex plunger pump unit. This equipment also includes a 40 horsepower motor, 50 gallon (189 l) surge tank, heavy-duty pressure valving, self contained shutdown level system and electric control panel.

Exclusively for Planetary Pan and Twin Shaft Mixers

Automatic High Pressure Washdown System - MixerWash

A high-pressure washdown system reduces operating costs and time. Any new mixer can be equipped with this cleaning device.



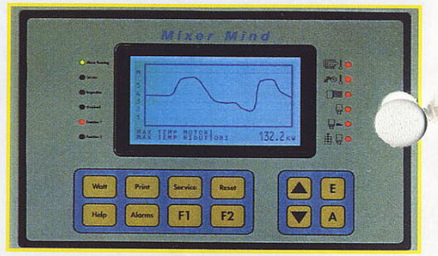
The system consists of two special rotating tubes running the full length of each side of the mixer. Water is fed via a triplex high-pressure pump delivering 53 gallons (200 l) of water per minute. Oscillating spray bars with multiple nozzles create a quick, effective washdown of the mixer. The typical wash cycle consists of running the pressure washer for about three minutes during each of three cycles. The automatic washing system can be started at the end of every shift for complete washout of the mixer. Alternatively, where concrete production is intermittent, a rinse can be provided between production periods. A high-pressure wand 1300 psi (90 bar) is provided for touch-up of any residual concrete build-up through the inspection doors.

Options:

- Shaft cleaning rings
- Electronic soft start
- Special materials for liners and paddles
- Variable speed control
- Flow-through end discharge arrangement

Electronic Check/Control System - MixerMind

Designed for automatic diagnostic operation and service planning, the MixerMind monitors motors, gear boxes and the automatic lubrication system for temperature, pressure and service. It also indicates the amp draw. Besser Simem extends the warranty on mechanical components of the mixer, including shaft seals, to 2 years when the MixerMind is installed.



Aggregates Loading Skip

Planetary mixers and the smaller range of Twin Shaft mixers (models 1250 to 3000) are available with an aggregates loading skip. The skip is designed with a foldable discharge gate that allows very fast flow of materials into the mixing tank through a dust suppressing inlet panel. The low profile design of the skip offers significant advantages when plant configurations require the skip to be loaded below grade.

Liners and Mixing Tools

Urethane, Ni-Hard and Ceramic are available.

BESSER

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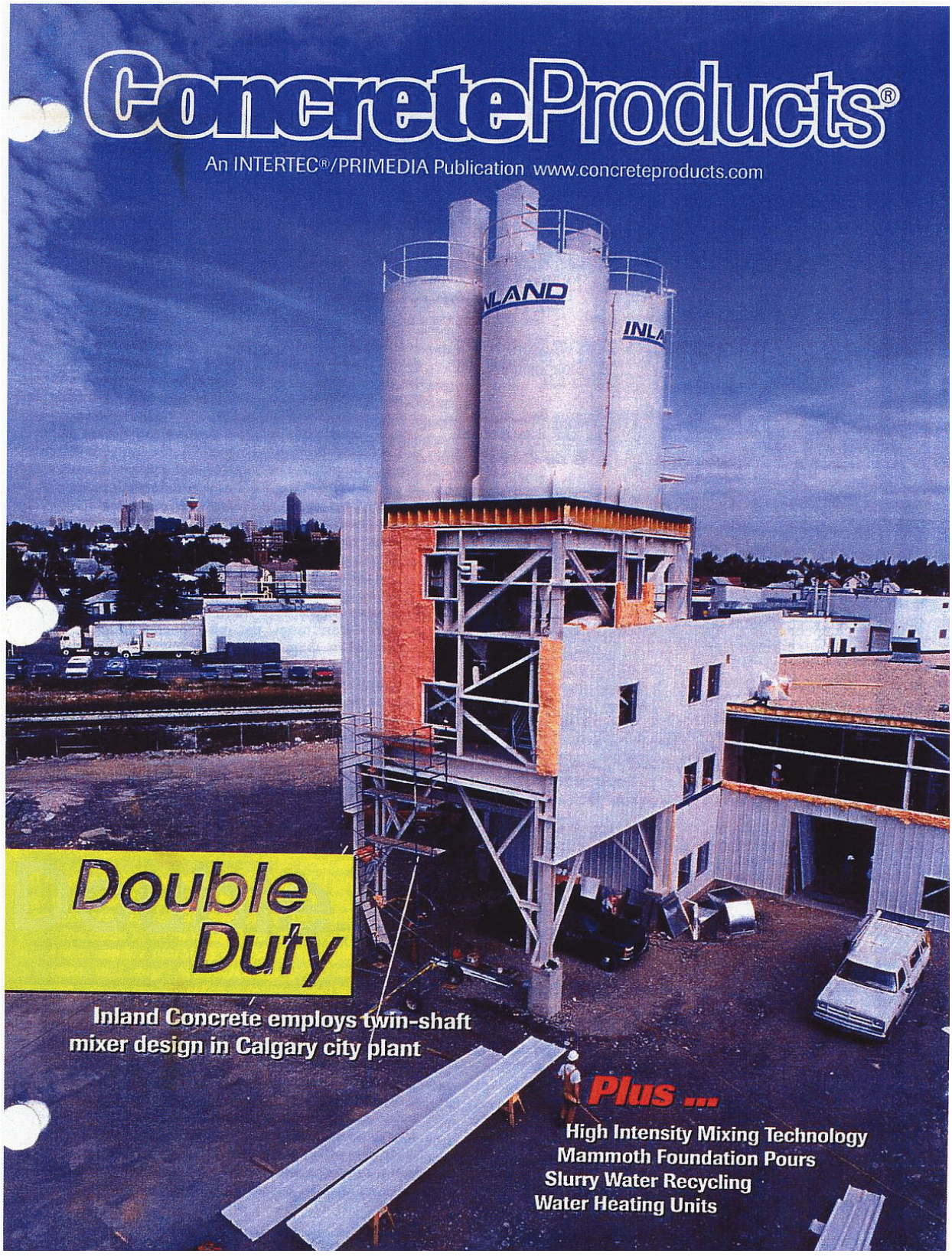
Sioux City, Iowa 51102 USA
phone: 712.277.8111
fax: 712.277.1222
e-mail: sales@besser.com

For better viewing, all guards, safety devices and signs are not necessarily shown. Some of the equipment shown or described throughout this brochure is available at extra cost. Since the time of printing, some of the information in this brochure may have been updated; ask your Besser sales representative for details.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Double Duty
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Slurry Water Recycling
Water Heating Units

Double Duty

Twin-shaft mixer technology takes hold in precast and ready-mix batch plant design

By Robert Ober

Note: This article is adapted from a report to the Precast/Prestressed Concrete Institute. It is followed by a sampling of twin-shaft mixer models available in North America.

Among those who purport to manufacture concrete by the most modern means, there are three critical areas of technological advancement generally recognized as significant within the batching/mixing phase:

- High-intensity mixing of the materials
- Automated moisture compensation and slump control
- Automated individual weigh batching of all mix materials

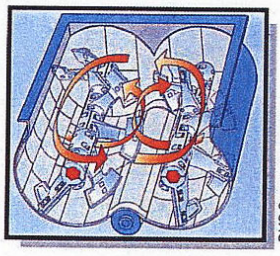
Mixing, by both modern means and less automated procedures, has long been recognized as the most critical phase in all types of concrete production. Homogeneous blending of mix components in a consistent manner continues to be the goal of manufactured-concrete and ready-mix producers.

In the past few years, a new type of high-intensity mixer commonly referred to as twin-shaft or double-shaft has appeared on the North American market. The design is really not new; for centuries it has been employed in the mixing of various materials. Recent design modifications, however, have yielded impressive results in the areas of precast, prestressed, pipe, block, and spun-cast product, plus central mix.

Better mixing

Though two horizontal shafts would appear to offer double the mixing action of a single-shaft ribbon-type mixer, this is not the case. Twin-shaft mixers are structured on an entirely different design and mix theory. Simply stated, twin-shaft mixers create a spiral flow of the entire contents of the mix, dividing the contents 16 times per revolution and creating a high-shear collision of materials eight times per revolution in the area between the shafts. This differs greatly from the rocking action of ribbon or single-shaft mixers. [Figure 1] Accordingly, the mixing action of a twin-shaft mixer is considerably more efficient.

Figure 1



BHS Systems

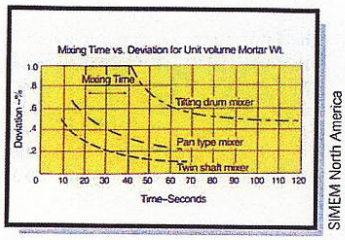
Unlike planetary-type countercurrent mixers often equated with high-intensity mixing, the twin-shaft mechanism does not stir through the contents, but rather moves the mixture en masse while dividing the mix multiple times within the prescribed mixing duration. The design principle in this case utilizes the inertia of the mix to create a true flow of material within the mixing cavity. Failing to understand this dynamic, one may be puzzled by the clearance between the mix shovels and the cavity liners allowed by twin-shaft mixer manufacturers. Because the material flows en masse, such clearances do not entail any type of scraping action; thus, lower wear rates are experienced as compared to planetary, pan, and countercurrent mixers, which stir through the concrete mix.

The twin-shaft design's blending action is not compromised by aggregate size or slump values. Originally, twin-shaft mixers in concrete production were used in civil wo projects — dam, tunnel, and mass concrete structures req ing up to 8-in. diameter coarse aggregate, as well as roller-compacted concrete (RCC) with virtually no slump.

Though many familiar with this type of work often confuse the twin-shaft mixer with volumetric or pugmill equipment, there are significant differences between such horizontal twin-shaft type mixers and the twin-shaft mixer developed and refined in civil works practice and made available to conventional-concrete producers. A pugmill or volumetric twin-shaft mixer is not a batch-type mixer. Spiral flow and figure-eight mixing action are not afforded in the pugmill or volumetric twin-shaft mixer designs. Mixing action in these other types of horizontal shaft units can best be described as augured.

By forcing the weight of the mix into collision above the shafts, a superior mix is achieved within the twin-shaft design. In tests performed by independent laboratories, the twin-shaft design provided the highest levels of mixer efficiency when mixing time vs. deviation for unit-volume mortar (by weight) were noted, as illustrated in Figure 2. In contrast to producers of large-aggregate mixes utilized in mass concrete applications, most companies rarely, if ever, are involved in the production of mixes containing coarse aggregate larger than 1½ in. For many producers, ¾-in. or less is the maximum coarse aggregate used. Does the twin-shaft mixer require large aggregate to affect a superior mix? Definitely not, if the proper mixing-shovel arm position is selected. A 45-degree pitch on the arms is best for working with ¾-in. minus. (A 60-deg arrangement can be substituted with suitable results.) M ufacturers offer 90-degree arrangements that have proved best for mass concrete and 180-degree arrangements suitable for 6- to 8-in. coarse aggregate and RCC.

Figure 2



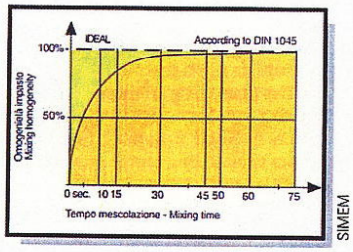
According to producers presently using twin-shaft units in North America, mixers with a 45-degree arm arrangement provide a superior mix. Consistently yielding high-quality mix faster than the planetary countercurrent or the ribbon mixer, twin-shaft mixers are employed with normal mix designs, albeit somewhat modified for reasons explored later. Slump deviation is reportedly nonexistent, and color dispersion in architectural mixes is achieved in a fraction of the time usually required.

Fast mixing

The twin-shaft design also affords the fastest mixing times presently available from any mixer configuration. In Germany, the DIN standard for mix-time has established that the twin-shaft design allows for 95 percent mixer efficiency in less than 30 seconds. Ideal mixing — 100 percent of the coarse and fine aggregate coated thoroughly by the available paste — is accomplished in 58 seconds. The U.S. Army Corps of Engineers has determined that twin-shaft mixers require only 30 of the 90 seconds specified for mixing after introduction of the last mix ingredients.

The mixer must pass the Corps' Mixer-Efficiency Test Program at 30 seconds. At several sites throughout the U.S. and Canada, where many Corps specifications are adopted, the twin-shaft mixer has proven to be extremely fast and versatile [Figure 3]. The speeds required by various mixes — colored, exposed-aggregate, high-strength, polymer, superplasticized, and low water/cement-ratio — do not deviate from the 30-60 second window.

Figure 3



The mixing chart shows 95 percent optimum mixing in less than 30 seconds. Such homogeneity is recognized according to Germany's DIN 1045 regulation.

Many producers, however, do not require maximum production from the twin-shaft mixer. Those presently utilizing the twin-shaft design are mixing from 30 seconds to 120 seconds, depending on delivery systems, chemical time requirements for high-range water reducers and the like. In any event, fast mixing times obtained with the twin-shaft mixer are proof of its efficiency and a boon for concrete producers employing such equipment.

Energy transformation equals higher strengths

Due to the specific motion of the twin-shaft design, the high turbulence area between the shafts creates a zone wherein the energy introduced into the mix is multiplied by the aforementioned inertia. This zone of intersection is dependent, as with all high-intensity mixers, on the net value of horsepower introduced. The enhancement of net horsepower value notwithstanding, the power utilized in the twin-shaft design is not less than that employed with the planetary countercurrent mixer design.

Most significant is what the twin-shaft mixer does with the net horsepower available. Twin-shaft mixer designs usually run at less than 30 rpm, with the shafts rotating away from one another at the 12:00 position and toward one another at the 6:00 position. The general rule of thumb where planetary countercurrent designs are concerned is to gauge the intensity of the mixer on the basis of the horsepower available.

Those who are familiar with the above-referenced equation will not be disappointed in the case of the twin-shaft mixer. A quick check of the manufacturer's data reveals that mixers of comparable size utilize drive motors and planetary or gear reduction boxes comparable to those of the planetary countercurrent design. *Horsepower = intensity* is true in the case of the twin-shaft mixer, though horsepower is magnified by the inertia-generated mixing action, i.e., spiral flow and turbulent intersection of the mix.

Twin-shaft designs utilize the available horsepower for a very short period of time. Amperes drawn by twin-shaft mixers peak within the first 10 seconds and stabilize at a much lower level as inertia takes over, resulting in lower power consumption as compared to pan or planetary countercurrent mixers. Ampere meters must be amplified or wattage meters installed by users of twin-shaft mixers to judge slumps, as the amp draw is so low on many mix designs that standard ampere meters are too coarse for slump determination.

In independent laboratory testing, mix designs yielded higher compressive strengths when utilizing the twin-shaft mixer over pan and countercurrent planetary mixers. Whether a reduction in cement is possible will be determined by several factors not affected by the mixer, e.g. aggregate strengths, cement type, overdesign factors, owners specifications, etc.

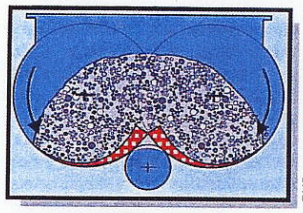
A review of design criteria and energy transformation and power consumption data for twin-shaft mixers reveals a mixer design capable of a wide variety of tasks beyond that required by most concrete producers. Such examination arguably points to a heavy-duty design well-suited for long service life.

Longer wear life

One would naturally assume that higher intensity mixing would result in higher wear rates. This is certainly the case in comparing drum mixers, ribbon mixers, pan mixers, and countercurrent planetary mixers; each of these is higher in intensity than its predecessor and exhibits a corresponding increase in wear. Yet the twin-shaft mixer — the highest-intensity unit presently available for a full range of concrete mixtures — offers a greatly improved wear life over both pan and planetary countercurrent mixers. The greater longevity of wear parts is easily explained by the mixing action of the twin-shaft mixer design. Because most of the mixing action occurs with the collision of material in the turbulent intersection zone, the twin-shaft mechanism is not pushing, pulling or stirring through the concrete.

Furthermore, due to the mixture area between and below the shafts, only a fraction of the mixing shovels and arms is actually in contact with wear tiles in the bottom third of the mixing tank at any one time. Most twin-shaft mixer manufacturers offer wear tiles that are identical in shape, allowing for rotation of the bottom tiles subjected to greatest wear with those tiles located at the top of the mixing tank where wear is almost nonexistent [Figure 4]. North American producers report that wear rates on their twin-shaft mixers are three to four times improved as compared to those of pan or countercurrent units. Wear rate on the twin-shaft mixer compares favorably to that of the much lower-intensity ribbon mixer.

Figure 4



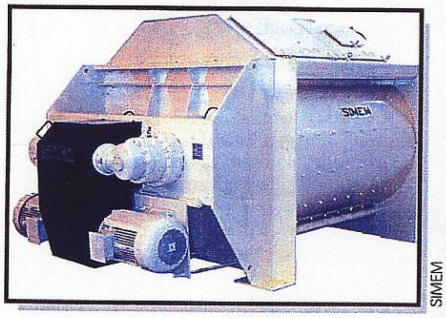
Note fewer wear zones: Only 30 percent of the shovel and shaft arrangements are in contact with the wearing zone on the base of the tank at any one time.

Mechanical description

Most manufacturers of twin-shaft mixers offer a rather compact design. One exception, however, is a Japanese brand that utilizes outboard-mounted electric-drive motors. These are flanged to horizontally mounted gear reducers, which in turn drive two independent drive sprockets and chain driving larger sprockets fixed to two bull gears, thus synchronizing the shafts.

By contrast, the best-selling twin-shaft mixer utilizes compact twin-stage planetary gearboxes (similar to gearboxes used on truck mixers). The gearboxes are timed with a driveshaft between them on which are mounted two pulley assemblies. Two independent electric drive motors mounted below run the multi-belt pulleys. This compact design allows for low overhead and relatively small footprint for in-place retrofit of planetary countercurrent, pan, or ribbon mixers [Figure 5].

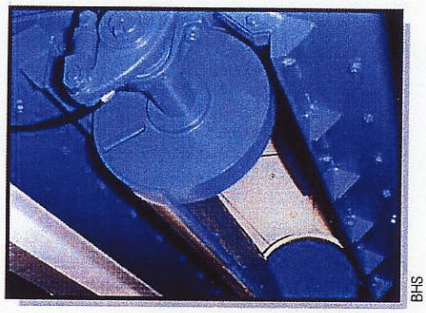
Figure 5



Compact design allows for retrofit and ease of maintenance. Note the dark-colored shroud illustrating the drive belt area.

Centered between the shafts, the discharge door of t twin-shaft mixer runs most of the length of the mixing tank. Many manufacturers offer a hydraulic-controlled gate system, similar to that used most commonly on modern planetary-countercurrent mixers. The gate can be opened wide for extremely fast discharge of the serpentined mixture or adjusted for gradual release when feeding belts or chutes. When opened wide, discharge is the fastest of any mixer configuration [Figure 6].

Figure 6



Center door facilitates rapid, full and complete discharge.

Reversing chute assemblies, flop gates or reversing bel are utilized with the twin-shaft mixer for feeding multi stations or replacing a multi-door pan or planetary-countercurrent mixer. Obviously, the design lends itself more favorably to new plant and material-handling system layouts; however, dozens of retrofits with twin-shaft mixers replacing multi-door planetary-countercurrent and ribbon mixers have occurred throughout North America over the past five years.

Cost benefit analysis

The price of twin-shaft mixers today is comparable to that of planetary-countercurrent or high-quality ribbon-type mixers. Until recently, the twin-shaft mixer was marketed only as a premium or specialty unit for major civil construction projects. The marketing efforts of twin-shaft manufacturers have lead to a rapid increase in the number of sales of twin-shaft mixers in North America. To producers' benefit, new competitors capitalizing on the growth in sales have entered the marketplace.

In assessing the benefits of the twin-shaft mixer, the producer should consider at the very minimum the following points:

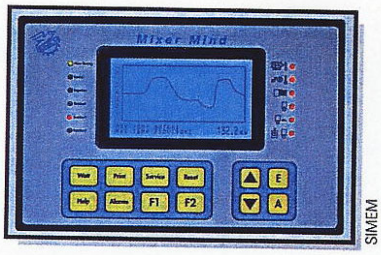
- Mix design savings
- Production values
- Value of homogeneous mix
- Value of consistency in mixes
- Superior color dispersion
- Average of 40,000 batches between complete wear parts exchange
- Overall electrical power consumption lower by 50 percent per year

Maintenance considerations

Originating with the roughest applications within the concrete industry, e.g., production of mass concrete and RCC, the twin-shaft design can be expected to offer a robust service to conventional concrete producers. With average mixing tank and shovel replacements occurring at 40,000 batches, rigorous demands have clearly been met. It is worth noting that this average is only slightly affected by mixer size: A 5-yd. mixer will produce an average of 200,000 yd. prior to replacement of the liners and shovels, while a 2-yd. version will produce 80,000 yd.

Under head pressure of at least one-third of the mixer volume, the shaft seals were a problem in early designs of the twin-shaft mixer. Increased maintenance resulted from such pressure as the shaft seals and bearing assemblies were exposed to grout. Some years ago, twin-shaft manufacturers began utilizing a labyrinth-type pressure seal with a mechanical-drive pump injecting a small amount of grease under pressure into the seal assemblies to prevent accumulation of grout in the clearance between the shafts and the bushings. Most manufacturers also mount the shaft bearings outboard — away from the seal assemblies. Automated sensing equipment is sometimes used to alert plant operators of excessively low grease levels or grease pressure too low to eliminate grout infiltration [Figure 7]. Twin-shaft users in North America report that those mixers equipped with automatic greasing systems and labyrinth seal assemblies have provided trouble-free operation in some cases for several years.

Figure 7



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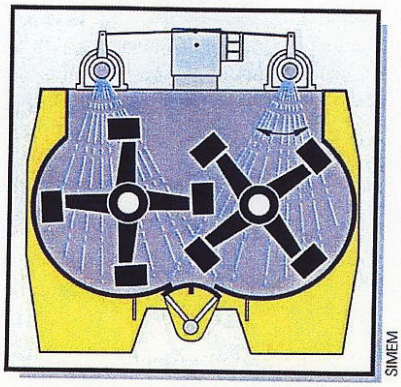
Mixer Mind electronic check-control system is especially designed for auto-diagnostic operation and service planning. It monitors motors, gearboxes, and the automatic lubrication system for temperature, pressure, and service. Amp draw is also indicated. The Mixer Mind extends the warranty on the mechanical components of the mixer, including shaft seals, to two years.

Cleanout of the twin-shaft mixer is much easier with the automated wash-down system — utilizing high-pressure water supplied from a triplex plunger pump — available from most manufacturers [Figure 8]. The 750-1,500 psi water is fed through two rotating pipes oscillating on a small mechanism similar to a windshield-wiper motor. Each pipe contains several high-pressure nozzles that wash down the inside of the mixing tank and both shafts as well as the arms and mixing shovels.

North American producers using the wash-down system report that it reduces clean-out time by three-quarters. The system is run for approximately three minutes, with water consumption at about 45 gallons per minute. To assist in the cleaning action at the end of each day, most producers fill the mixer with a small amount of coarse aggregate.

Figure 8



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Architectural precast producers, who use the wash-down system several times per day with various colored mixes following one another, report that it does a remarkable job. Many such producers have installed a single twin-shaft mixer in lieu of two pan or planetary mixers, allowing for consecutive batches of structural backing and architectural face mixes.

Conclusion

As with any new paradigm encountered in concrete production, the twin-shaft mixer has been met with skepticism. Nevertheless, over the past few years the equipment has received considerable acclaim and earned the respect of many North American producers.

In the past 100 years, the twin-shaft mixer has been utilized for the most demanding application—concrete production. In Europe and Asia, twin-shaft mixers have been employed by precast and ready-mix producers for several decades. In fact, the twin-shaft in both areas is the leading mixer specified for ready-mix production, even though the largest twin-shaft mixer provides 8 yd. compacted output (32,500 lb.). Given the rapid mixing times, ready-mix producers utilize smaller sizes of mixers for a double or triple batch for every truck charged. One manufacturer is currently testing a 10-yd. model (42,000 lb.) sized for paving operations.

Thus, for North American producers, the twin-shaft mixer provides a good alternative to conventional mixers. It wasn't long ago that many procedures and types of equipment commonly used today by concrete producers were considered unconventional. Smart producers will want to explore the possibilities of twin-shaft mixers for their operations as they look toward ever increasing productivity.

Robert Ober is a member of the American Concrete Insitute, Construction Specifications Insitute, and Precast/Prestressed Concrete Institute. A mechanical engineer, he is Managing Director of SIMEM North America, LLC, in Denver. Mr. Ober has been involved in the use of most major brands of twin-shaft mixers over the past 20 years while working in the custom batch plant and control business within the civil, ready-mix, pipe, block, precast and prestress industries. Mr. Ober is a past publisher of The Concrete Producer, Masonry Construction, *and* Concrete Construction. *He can be reached at 800/330-5590 or rober@besser.com (e-mail).*